CODIP
Technology at Work

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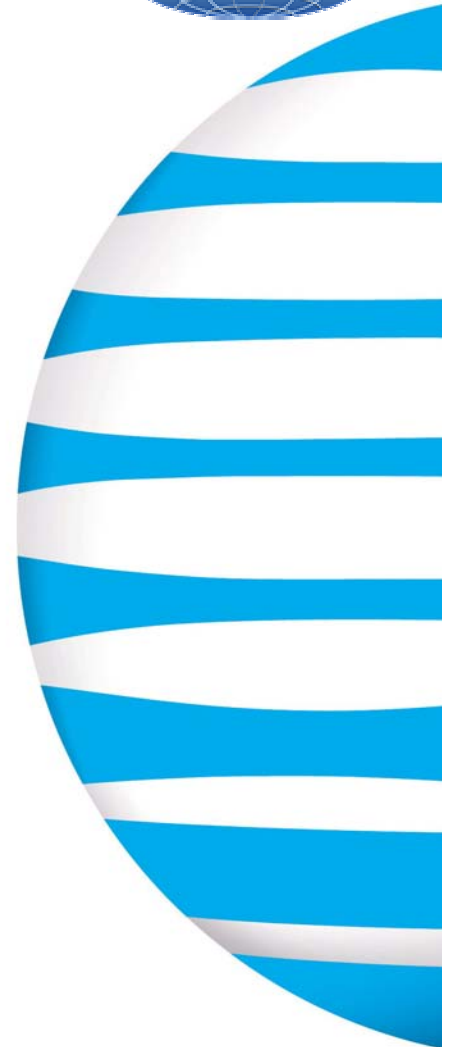
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The CODIP program provides frameworks and components for intelligent processing of information based on its semantics.

- **Distribution of information from publishers to subscribers using subscriber defined semantic queries.**

- **Automatic generation of semantic mapping between ontologies to facilitate database integration, content translation and distribution.**

- **Application of a UML technology to leverage existing resources to provide knowledge engineering capability.**

- **Ontological processing components and services that can bring built-in knowledge processing capability to applications.**

- **Primary products support these applications:**

  – **<u>Duet</u>** to support visualization, application and management of ontologies using the UML/MOF engineering standards,

  – **<u>Kage</u>** to support applications with analysis, translation, and repository functionality,

  – **<u>ODKD</u>** for semantics based publication of information to subscribers, and

  – **<u>Artic</u>** to support using multiple ontologies concurrently by finding and codifying relationships between their concepts.

- **These products are built from library of reusable components that may be integrated into other applications.**

http://codip.grci.com

Artic Functional Architecture
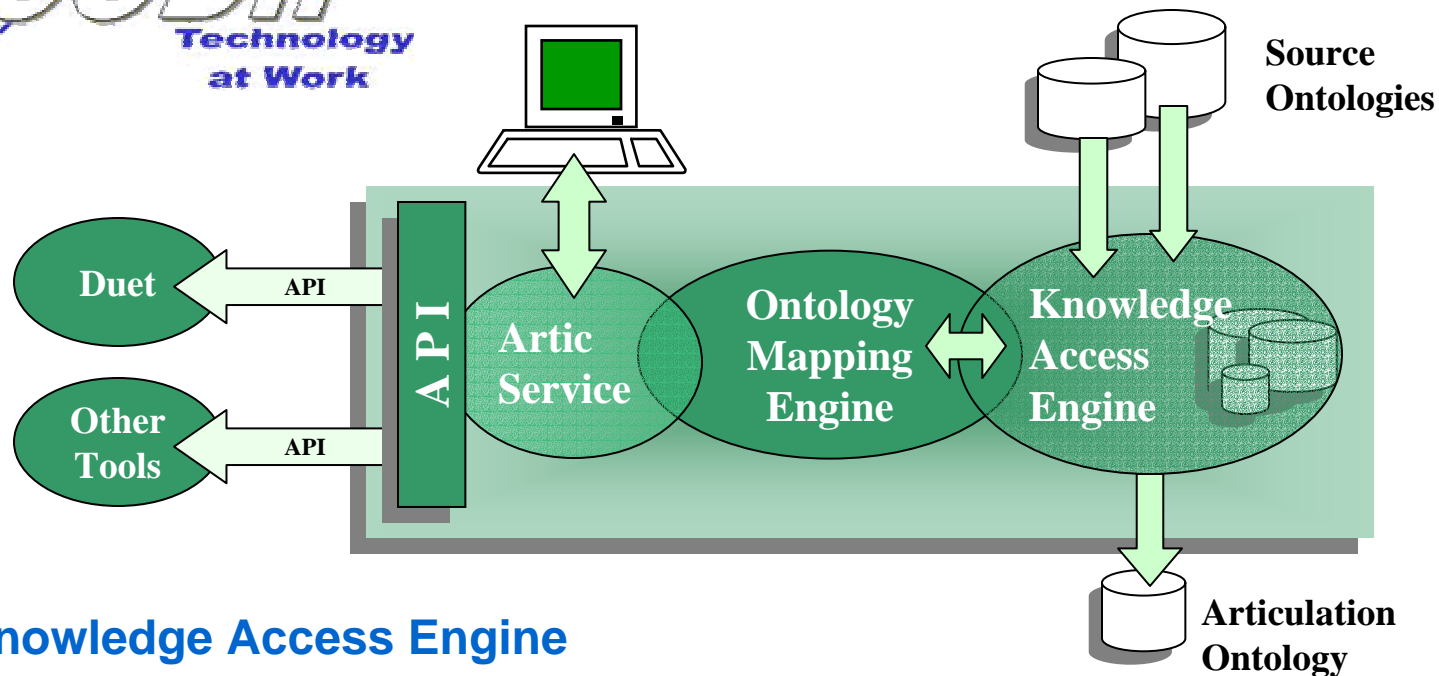
- **Knowledge Access Engine**
  - Provides management and access to collections of ontologies.
- **Ontology Mapping Engine**
  - Provides automated analysis of potential mappings between ontologies and builds articulation ontologies that codify the mappings.
- **Artic Service**
  - Provides APIs, command line and web based access to the mapping engine.
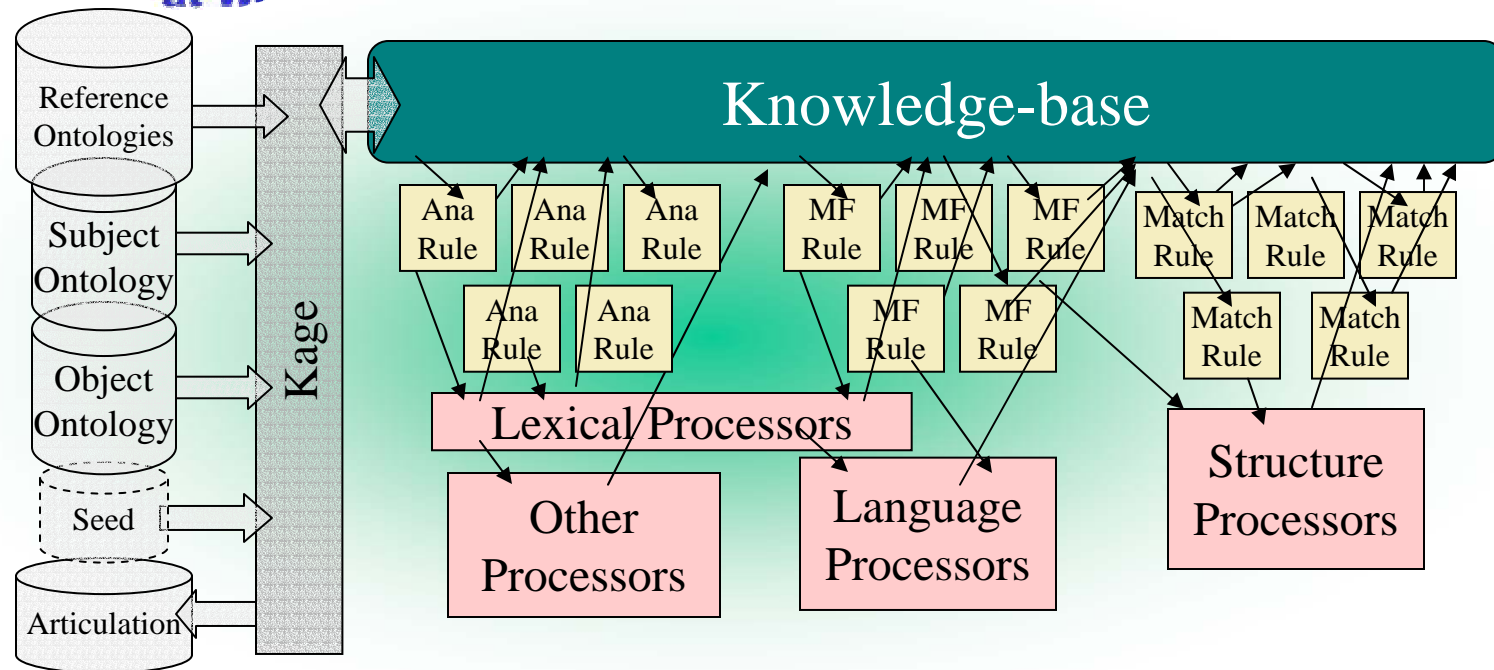
- **Multiple Layers**
  - Non-procedural rules and procedural processors, invoked by rules.
- **Multiple Phases**
  - Analysis, Match Factors, Matches.

Articulation Ontologies

- **Articulations are specialized ontologies that relate concepts in other ontologies.**

  - Relationships of various types:

    » Similarity, Part-Of, Kind-Of, Temporal, Spatial, and Domain Specific.

  - Multiplicity may be 1:1, 1:M, M:1 or M:M

  - Variable 'strength'.

  - May include conversion rules, which may be one-way.

Source Ontology

Target Ontology

Width

Length

Same_As

In

Convertible _To

In

Out

Area

Conversion Rule:
subject.Area := Source.Width *Source.Length

Articulation

6

BoatWidth
file:Shipyard_2.owl#genid308

owl:equivalentTo

BoatWidth
file:Shipyard_3.owl#genid311

```
<Match
  kind"="owl:sameIndividualAs"
  rdf:about="artic2659"
  strength="10.00" >
```

```
<MatchFactor rdf:about="artic1913"
  detail="BoatWidth"
  kind="EX_NM_MTCH:ele_nm"
  strength="7">
```

```
MatchFactor rdf:about="artic2271"
  detail="Boat width in meters
              rounded up."
  kind="PHRASE_MTCH:ele_defn"
  strength="10">
```

reasons

```
<MatchFactor rdf:about="artic2394"
  detail="BoatWidth"
  kind="EX_NM_MTCH:ele_access_nm"
  strength="6">
```

```
<MatchFactor rdf:about="artic2341"
  detail="FLOAT8"
  kind="EX_DT_MTCH:ele_data_type"
  strength="2">
```

Parent Match

WorkOrder
file:Shipyard_2.owl#genid662

owl:equivalentTo

WorkOrder
file:Shipyard_3.owl#genid735

<Match
  kind"="owl:sameIndividualAs"
  rdf:about="artic3027"
  strength="8.60" >

reasons

<MatchFactor rdf:about="artic1730"
  kind="EX_NM_MTCH:tbl_nm"
  detail="WorkOrder"
  strength="8">

<MatchFactor rdf:about="artic1819"
  detail="Unique marina work order ID."
  kind="PHRASE_MTCH:ele_defn"
  strength="8">

<MatchFactor rdf:about="artic3029"
  detail="artic3027 artic2999"
  kind="**TBL_ELE_MTCH**"
  strength="3">

Structural Match
Matching elements
found in matching
tables generate
reciprocal factors

MatchFactor rdf:about="artic3030"
  detail="artic3027 artic2999"
  kind="**ELE_TBL_MTCH**"
  strength="9">

<MatchFactor rdf:about="artic1825"
  detail="INTEGER"
  kind="EX_DT_MTCH:ele_data_type"
  strength="2">

<Match
  kind"="owl:sameIndividualAs"
  rdf:about="artic2999"
  strength="9.84" >

reasons

WorkOrderID
file:Shipyard_2.owl#genid308

owl:equivalentTo

OrderID
file:Shipyard_3.owl#genid342

Child Match

8

- **Pre Processing applies transformations to**
  - Convert DAML and RDFS to compatible OWL equivalents.
  - Adds XML Base namespace if needed.
- **Post Processing applies transformations to**
  - Convert Articulation to Alignment format.
  - Remove low confidence (< 0.8) and uninteresting matches (e.g. 'genid').
  - Removes faulty matches (e.g. rdf:ID=" ")

	Animals	Sports	Comsci	Hotel	Network	P&P	P&P-noi	Russia
Alignments	83	187	0	15	44	128	286	150
Confidence								
Maximum	1.0006	0.9671	0.0000	0.9396	1.0011	1.0012	0.9824	0.9997
Minimum*	0.8423	0.8423	0.0000	0.8435	0.8423	0.8423	0.8423	0.8423
Average	0.9283	0.9223	N/A	0.8808	0.9051	0.9111	0.9255	0.9024
Median	0.9326	0.9384	N/A	0.8709	0.9374	0.9374	0.9358	0.9359

* Confidence < 0.8 removed.

- **Issues**
  - Namespaces – XML Base needed to allow local file usage.
  - ID verses rdf:ID – leads to resources with no ID.
- **Semantic differences between RDF/S, DAML+OIL, OWL**
- **Some results not understood**
  - Comsci topic lead to no alignments
  - Removal of instance data in People&Pets produced <u>more</u> alignments.